Dynamic Behavior of Programs (算法言語の設計-記述-処理の研究 : ALGOL N)

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§5. Dynamic Behavior of Programs

5.1 Creation

In the beginning, we must create two sets $\mathbb{Q}_0$ and $\mathbb{V}_0$.

5.1.1 All ⟨expression⟩'s in standard ⟨declaration⟩'s are rewritten in the form of normal (as defined in the next paragraph).

5.1.2 Let $\mathbb{V}_0$ stand for the set of the all ⟨identifier⟩'s declared by some standard ⟨declaration⟩, and let $\alpha(V)$ be <u>able</u>, and $\varphi(V)$ be an abstract element, different from each other, for each ⟨variable⟩ V in $\mathbb{V}_0$.

5.1.3 Let $\mathbb{Q}_0$ stand for the set

$$\{ \varphi(V) \mid V \in \mathbb{V}_0 \},$$

and let $v(Q)$ be the value of Q for each $Q \in \mathbb{Q}_0$.

(If standard ⟨declaration⟩ of a ⟨variable⟩ $V \in \mathbb{V}_0$ is of the form

"<u>let</u> V <u>be procedure</u> $(T_1, \ldots, T_n)T$ <u>by</u> $((V_1, \ldots, V_n)E)$"

and $\varphi(V) = Q$, then

$v(Q)$ is $(V_1, \ldots, V_n)E$.)

5.1.4 Let QO stand for an abstract element $\notin \mathbb{Q}_0$, and let LO stand for a ⟨label⟩.

5.2 Normalization

Let E_1 stand for a legal program, $\mathbb{V}_1$ stand for the set of the all ⟨identifier⟩'s contained in E_1, and $\mathbb{L}_1$ stand for the set of the all ⟨label⟩'s contained in E_1.

1) Let $\mathbb{V}$ stand for $\mathbb{V}_0 \cup \mathbb{V}_1$, and let $\alpha(V)$ be <u>inable</u> for $V \in \mathbb{V} - \mathbb{V}_0$.

2) Let $\mathbb{L}$ stand for $\mathbb{L}_1 \cup \{LO\}$.

3) Let $\mathbb{Q}$ stand for $\mathbb{Q}_0 \cup \{QO\}$, and let $v(QO)$ be <u>done</u>.

4) $\gamma(E_1) \Rightarrow E_2$.

5) Let D be a ⟨form declaration⟩ in E_2 of the form

"<u>let</u> G <u>represent</u> F"

with a ⟨form⟩ G and an ⟨expression⟩ F.

$\mathfrak{e}(\mathbb{V}) \Rightarrow V$;

Replace in E_2 D with

"let V be F ;

let G represent V ; ".

6) Let E' be a ⟨form call⟩ in E_2, of the form

" $P_o E_1' P_1 E_2' P_2 \ldots\ldots P_{n-1} E_n' P_n$ "

where E_1', ..., E_n' be ⟨expression⟩'s and P_i be empty or a sequence of ⟨mark⟩'s for i = 0, 1, ..., n. If the operator form $(P_o t(E_1') P_1 t(E_2') P_2 \ldots\ldots P_{n-1} t(E_n') P_n)$ is declared by a declaration of the form

"let G represent F",

then, replace E' in E_2 with

"(F)(E_1', ..., E_n')".

7) When T is a ⟨typifier⟩ in E_2, replace T in E_2 with t(T).

8) Eliminate all ⟨form declaration⟩ and ⟨mark declaration⟩ in E_2, and let E stand for the result.

An ⟨expression⟩ of the form as E is called normal.

5.3 Elaboration of a Normal Program

$\mathfrak{e}(E)$;

if the result is a quantity Q, then the elaboration of E is thus completed, but if the result is a ⟨label⟩ L, then the elaboration of E is undefined.